

**REMARKS**

**I. Status of the Claims**

Claim 11 has been amended to specify a “predetermined interval.” Support for this amendment can be found in the specification as filed at page 22, line 5. Claim 11 is further amended to specify that “the interval between a portion of maximum Al content and an adjacent portion of maximum Ti content is 0.01 to 0.1 µm.” Support for this amendment can be found in the specification as filed, for example, at page 22, lines 10-12, and at page 24, lines 8-18. These amendments add no new matter.

Claim 12 has been amended to clearly specify that “the hard substrate is composed of cemented carbide that contains tungsten carbide.” This amendment adds no new matter.

Claim 13 has been amended to clearly specify that “hard substrate is composed of cermet that contains titanium carbonitride.” This amendment adds no new matter.

Claims 15-18 have been newly added and add no new matter.

Claims 1-18 are pending in this application.

**II. Rejection under 35 U.S.C. § 112**

Claims 12 and 13 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner contends that the word “based” renders these claims indefinite.

In response, Applicant has amended Claim 12 to recite “hard substrate is composed of cemented carbide that contains tungsten carbide,” and claim 13 to recite “hard substrate is composed of cermet that contains titanium carbonitride.”

Accordingly, Applicant respectfully submits that claims 12 and 13 are no longer indefinite, and respectfully requests that the rejection of claims 12 and 13 under 35 U.S.C. § 112, second paragraph be withdrawn.

### III. Rejection under 35 U.S.C. § 103

Claims 1-10 and 12-14 are rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,827,976 to Derflinger et al. (“Derflinger”) in view of U.S. Patent No. 5,728,465 to Dorfman et al. (“Dorfman”). Applicant respectfully traverses the rejection.

The Examiner contends that Derflinger discloses the claimed coating with an overlayer including carbon with tungsten carbide (WC), and Dorfman disclosed the known inclusion of TiN in carbon coatings within the claimed proportions. However, Applicant notes that Derflinger merely discloses layers consisting of WC or WC with dispersed carbon (WC/C) (*see* Derflinger at column 4, lines 14-17), which does not correspond to the carbon based amorphous material containing W claimed in the instant application. Although Derflinger does disclose a matrix of amorphous carbon with nano-crystalline carbide cores (*see* Derflinger at column 6, lines 36-37), Derflinger does not disclose an amorphous material containing W.

The Examiner contends that Dorfman discloses the inclusion of TiN in carbon coatings within the claimed proportions and that it would have been obvious to one of ordinary skill in the art to include TiN in the carbon coating of Derflinger, as this inclusion improves the performance of carbon layers in Dorfman. While Dorfman does disclose a coating comprising a diamond-like nanocomposite (DLN) material, where the dopant compound may be TiN (*see* Dorfman at column 4, lines 35-37), Dorfman’s coating is characterized by not containing any granular particles in the atomic or molecular scale network structure. The absence of clusters at the atomic scale is a key characteristic of Dorfman’s coating and also further teaches away from the inclusion of crystalline grains of the size of the claimed invention. Dorfman at column 3, lines 40-45 discloses:

The DLN materials have an amorphous structure and do not contain clusters greater than **10 Angstroms**. This absence of clusters at the atomic scale is a key characteristic of the DLN coatings of the present invention. Clusters can destroy amorphous nature of the structure, and can serve as active centers of degradation. (emphasis added).

Therefore, Dorfman does not teach and cannot imply crystal grains dispersively distributed in the amorphous matrix. Based on at least these reasons, Derflinger in view of Dorfman does not render claims 1 and 14 obvious. Claims 2-10, 12, and 13 depend from claim 1, which is allowable at least based on the arguments presented above. Applicant respectfully requests that the rejection of claims 1-10 and 12-14 under 35 U.S.C. § 103(a) be withdrawn.

Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Derflinger in view of Dorfman in further view of U.S. Patent No. 7,094,479 to Sato et al. ("Sato"). Applicant respectfully traverses this rejection.

The Examiner contends that Derflinger in view of Dorfman discloses the invention substantially as claimed except for the claimed alternating intermediate layers, and relies on Sato to cure this deficiency. As argued above, the constitution of the upper layer is not obvious over Derflinger in view of Dorfman. With respect to the lower layer, Sato discloses an alternately layered structure where the minimum aluminum composition is shown by  $(Al_Y Ti_{1-Y})N$ , in which  $Y=0.40$  to  $0.65$ . In contrast, the atomic ratio of Al in instant claim 11 is smaller than that of the minimum aluminum composition disclosed by Sato. Specifically, in instant claim 11, the portion of maximum Ti content satisfies a compositional formula  $(Ti_{1-X} Al_X)N$ , in which X ranges from 0.05 to 0.35 by atomic ratio. Therefore, claim 11 is not obvious even when Sato is combined with Derflinger and Dorfman.

Thus, for at least the reasons stated above, claims 1-10 and 12-14 are not obvious over Derflinger in view of Dorfman, and claim 11 is not obvious over Derflinger in view of Dorfman in further view of Sato. Applicant respectfully requests that the rejections under 35 U.S.C. § 103(a) be withdrawn.

#### IV. New claims

New claim 15 is supported by Tables 3, 4, 8, 9, 11, 12, and 16 in the specification as filed. The minimum grain diameter value is supported by Table 16 (Types 15, 15'). The claimed invention has particle sizes with a grain diameter greater than 4.8 nm, wherein none of

the art of record discloses particles of that size. Further, Dorfman specifically teaches away from the claimed invention.

New claims 16, 17, and 18 incorporate subject matter from claims 2, 6, and 15, respectively. Moreover, new claims 15 and 16-18 are dependent on claims 1 and 14, respectively, which are allowable at least based on the arguments presented above.

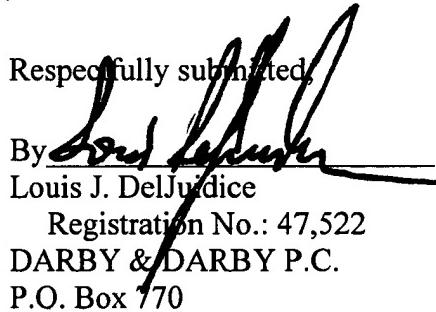
### CONCLUSION

Each and every point raised in the Office Action mailed April 15, 2009 has been addressed on the basis of the above remarks. In view of the foregoing it is believed that claims 1-18 are in condition for allowance and it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

By   
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